1. An aerosol-particle analyzer (APA) for measuring an analyte in any particles found in a gas comprising:

   (a) an analysis liquid chosen such that when the analysis liquid is mixed with the particles, an optical property of the analysis liquid varies according to the amount of the analyte in the particles;

   (b) an analysis-liquid-handling subsystem (ALHS) consisting of an analysis-liquid container (ALC) that holds the analysis liquid, a pump that is connected to the ALC and that controls the pressure of the analysis liquid in the ALC, a small hole in the ALC through which the analysis liquid can be expelled from the ALC by increasing the pressure in the ALC and can be drawn back into the ALC by decreasing the pressure in the ALC, an electrode that is in contact with the analysis liquid in the ALC and that is used to control the electrical potential of the analysis liquid, and a shield electrode around the hole that is given a potential opposite that of the analysis liquid, such that:

      (i) a charged volume of the analysis liquid is held at the hole in the ALC (CVALH) so that any particles in the gas, especially any particles that are charged opposite to the voltage of the CVALH, can collide with the CVALH and react with it so the optical property of the analysis liquid can be measured, and the amount of analyte can be determined, and

      (ii) a small volume of the analysis liquid can be ejected and thereby generate

a new CVALH so that the next measurement can take place,

(c) a charger that imparts a charge to airborne particles drawn through it;

(d) a substantially gas-tight container, having a gas-tight connection to the ALHS such that the CVALH extends into the gas-tight container so that it is exposed to the gas and particles inside the gas-tight container, a gas-tight connection to the charger, through which gas and any charged particles enter the gas-tight container where said gas-tight connection and charger are positioned such that the gas and any particles pass near the CVALH, and having a vacuum connection;

(e) a vacuum pump connected to the vacuum connection of the gas-tight container that draws the gas and any particles into the gas-tight container through the input and past the CVALH so that the particles can collide with the CVALH, and draws the gas and any particles that did not collide with the CVALH out through the vacuum connection;

(f) a means to measure changes in the optical property of the CVALH so that the amount of analyte in the particles that combined with the CVALH can be determined from these measurements of the optical property; and

(g) a collection vessel to collect and store the CVALH ejected from the hole after the optical property of the CVALH has been measured.

2. The APA of claim 1 wherein the optical property is a fluorescence property chosen from a group consisting of the fluorescence intensity, the fluorescence polarization, the fluorescence spectrum, and the fluorescence lifetime.

3. The APA of claim 1 wherein the optical property is a light scattering property chosen from a group consisting of the intensity, polarization, spectral intensity, and angular-dependent intensity.

4. The APA of claim 1 wherein the analysis liquid is a water solution that contains sensor molecules that selectively bind to the analyte.

5. The APA of claim 4 wherein the sensor molecule is an antibody.

6. The APA of claim 4 wherein the sensor molecule is an aptamer.

7. The APA of claim 4 wherein the sensor molecule is a phage-displayed epitope.

8. The APA of claim 4 wherein the sensor molecule is a nucleic acid.

9. The APA of claim 1 wherein the analysis liquid contains B cells modified to emit light

when they come in contact with the analyte.

10. The APA of claim 1 wherein the charger generates a corona discharge.

11. The APA of claim 1 wherein the charger is an electrospray apparatus.

12. The APA of claim 1 wherein said APA further includes a temperature sensor and a humidity sensor, so that the measured temperature and humidity of the gas in the airtight container can be used to determine the rate the pump pumps and the rate the analysis liquid moves through the hole.

13. The APA of claim 1 further including a reservoir of water, a water pump, and a tube that connects the reservoir of water to the CVALH so that any water that evaporates from the CVALH can be replenished during the measurement time so that the ionic strength of the analysis liquid can be maintained.

14. The APA of claim 13 wherein in the water in the reservoir of water, further includes additional molecules suitable for a two-step reaction for detection of the analyte.

15. The APA of claim 1 further including an aerosol particle counter to measure the

concentration of, and sizes of, particles in the gas so that the numbers and sizes of particles that combine with the CVALH can be approximately determined by using calibration data.

16. The APA of claim 1 wherein the analysis liquid further contains at least one additional sensor molecule that selectively binds to an additional region of the analyte.

17. The APA of claim 16 wherein when the additional sensor molecule binds to the additional region of the analyte, the fluorescence of an additional fluorophore changes, and wherein the spectral peak of the fluorescence emission that changes when the sensor molecule binds to the analyte is different from the spectral peak of the fluorescence emission that changes when the additional sensor molecule binds to the additional region of the analyte.

18. The APA of claim 1 wherein the analysis liquid further contains at least one additional sensor molecule that selectively binds to an additional analyte.

19. The APA of claim 18 wherein, when the additional sensor molecule binds to the additional analyte, the fluorescence of an additional fluorophore changes, and wherein the spectral peak of the fluorescence emission that changes when the sensor molecule

binds to the analyte is different from the spectral peak of the fluorescence emission that changes when the additional sensor molecule binds to the additional analyte.

20. The APA of claim 19 wherein said APA further includes means to measure multiple optical properties of one CVALH.

21. The APA of claim 1 wherein said APA further includes a means to remove and replace the receptacle, so that the ejected CVALH that have been collected in the receptacle, or what remains from the CVALH after the water has evaporated, can be further analyzed.

22. The APA of claim 1 further including an aerosol particle concentrator deployed between the inlet and the charger, wherein said concentrator concentrates the particles before they enter the charger so that the APA is sensitive to particles which contain lower concentrations of analyte and to lower concentrations of any particles that contain the analyte.

23. The APA of claim 1 wherein said APA further includes multiple receptacles and a means to sort, by using electrostatic forces, the ejected CVALH into different receptacles according to the measured value of the optical property.

24. An aerosol-particle analyzer (APA) for measuring an analyte in any particles found in a gas comprising:

(a) an analysis liquid chosen such that when the analysis liquid is mixed with the particles, an optical property of the analysis liquid varies according to the amount of the analyte in the particles;

(b) an analysis-liquid-handling subsystem (ALHS) consisting of an analysis-liquid container (ALC) that holds the analysis liquid, a pump that is connected to the ALC and that controls the pressure of the analysis liquid in the ALC, a small hole in the ALC through which the analysis liquid can be expelled from the ALC by increasing the pressure in the ALC and can be drawn back into the ALC by decreasing the pressure in the ALC, an electrode that is in contact with the analysis liquid in the ALC and that is used to control the electrical potential of the analysis liquid, and a shield electrode around the hole that is given a potential opposite that of the analysis liquid, such that:

(i) a charged volume of the analysis liquid is held at the hole in the ALC (CVALH) so that any particles in the gas, especially particles that are charged opposite to the voltage of the CVALH, can collide with the CVALH and react with it so the optical property of the analysis liquid can be measured, and the amount of analyte can be determined, and

(ii) a small volume of the analysis liquid can be ejected and thereby generate a new CVALH so that the next measurement can take place,

(c) a substantially gas-tight container, having a gas-tight connection to the ALHS such that the CVALH extends into the gas-tight container so that it is exposed to the gas and particles inside the gas-tight container, a gas and particle inlet through which the gas and any particles enter the gas-tight container where said inlet is positioned such that the gas and any particles pass near the CVALH, and having a vacuum connection;

(d) a vacuum pump connected to the vacuum connection of the gas-tight container that draws the gas and any particles into the gas-tight container through the input and past the CVALH so that the particles can collide with the CVALH, and draws the gas and any particles that did not collide with the CVALH or a surface of the gas-tight container or ALHS out through the vacuum connection;

(e) a means to measure changes in the optical property of the CVALH so that the amount of analyte in the particles that combined with the CVALH can be determined from these measurements of the optical property; and

(f) a collection vessel to collect and store the ejected CVALH after the optical property of the CVALH has been measured.